

Self-Interference-Tolerant Receiver for Shared-Aperture In-Band Full-Duplex Arrays

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Introduction

- Self-interference-tolerant receiver for shared-aperture in-band full-duplex (IBFD) array • 28-nm CMOS LPP

Main Subject

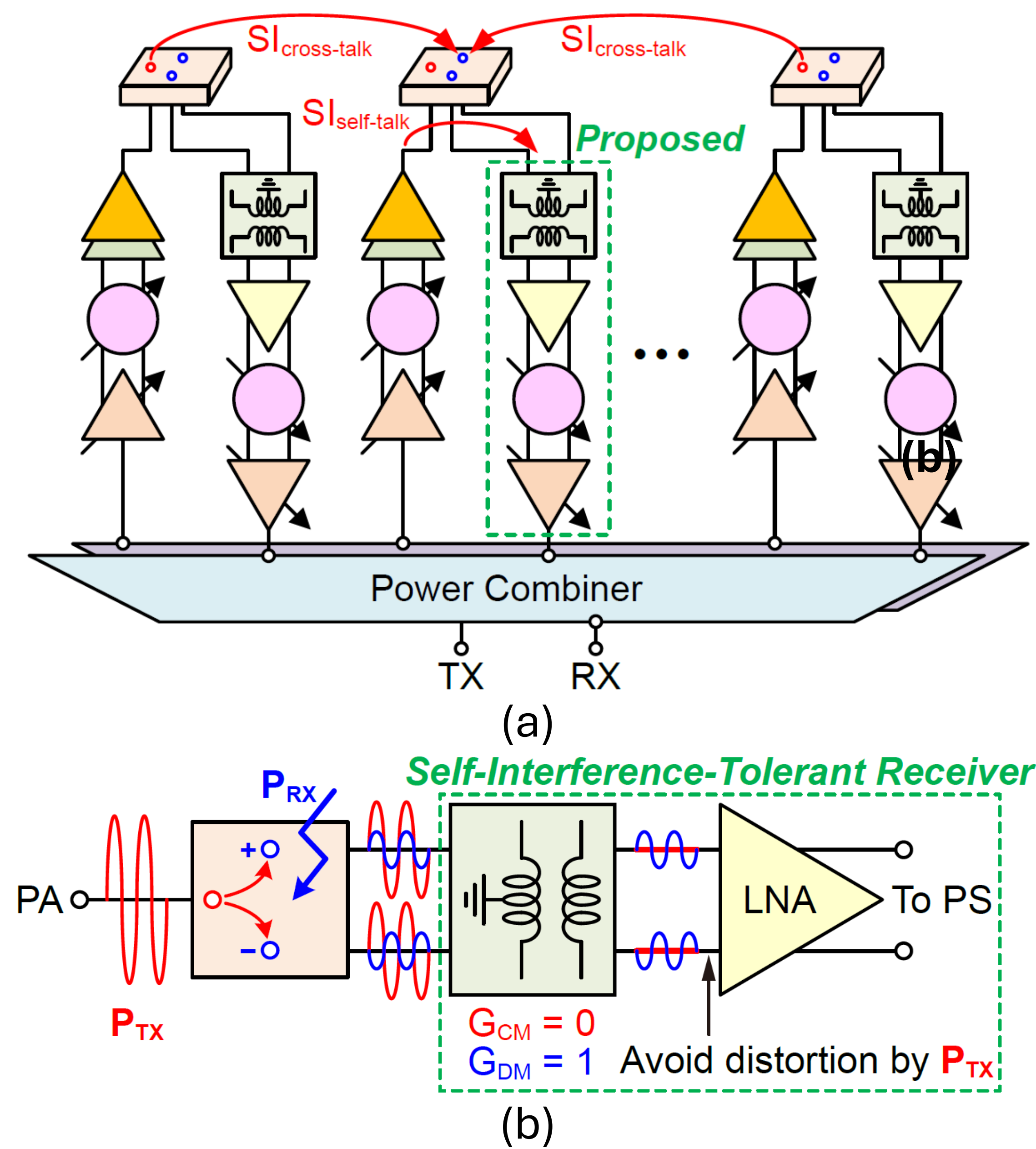


Fig. 1. (a) Block diagram of the shared-aperture IBFD array, and (b) the design consideration of the proposed receiver

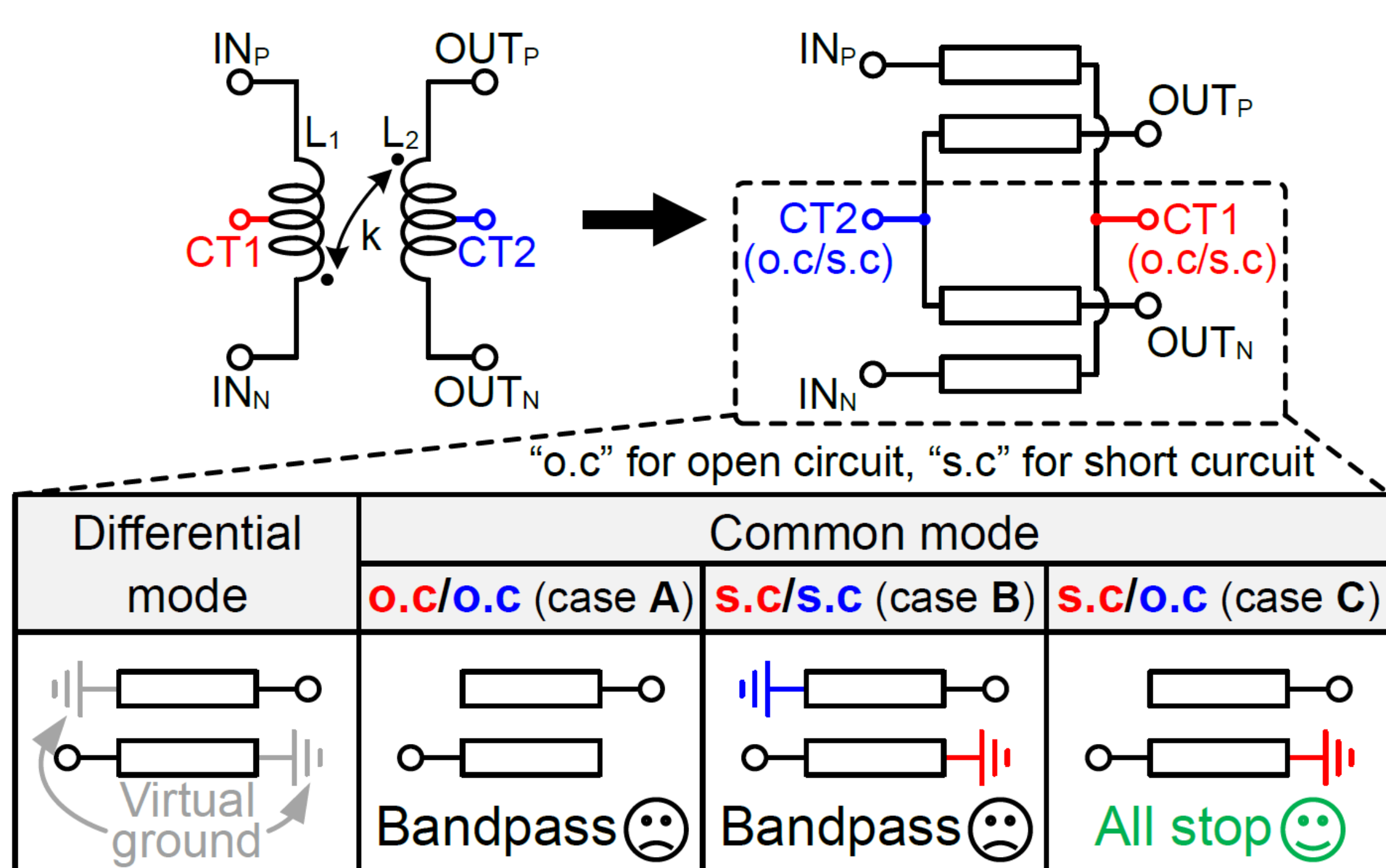


Fig. 2. Even- and odd-mode analysis of transformer for different center-tap configurations

- By employing transformer with an optimized center-tap configuration, high rejection and simultaneous matching are achieved with a compact area.
- The phase shifter is placed between the LNA and the VGA to improve the linearity.
- Due to the low NF and sufficient gain of the LNA, the loss of phase shifter has barely any impact on the overall receiver NF.
- Peak gain : 19.3 dB, 3-dB BW : 12.1 – 14.3 GHz, NF > 3.4 dB, IP_{1dB} > -18 dBm, IIP3 > -10 dBm, B_{1dB} : 27 dBm, P_{DC} : 14.5 mW

Conclusion

- High common-mode rejection receiver for IBFD arrays • Low power consumption chip design for scalability

Reference

[1] H. Fan, et al, "A Wideband, High Isolation, Shared-Aperture MIMO IBFD Front End With CMS Balun and Fewer Multitap Cancellers," *IEEE Trans. Microw. Theory Techn.*, vol. 73, no. 9, pp. 6918–6930, Sep. 2025.

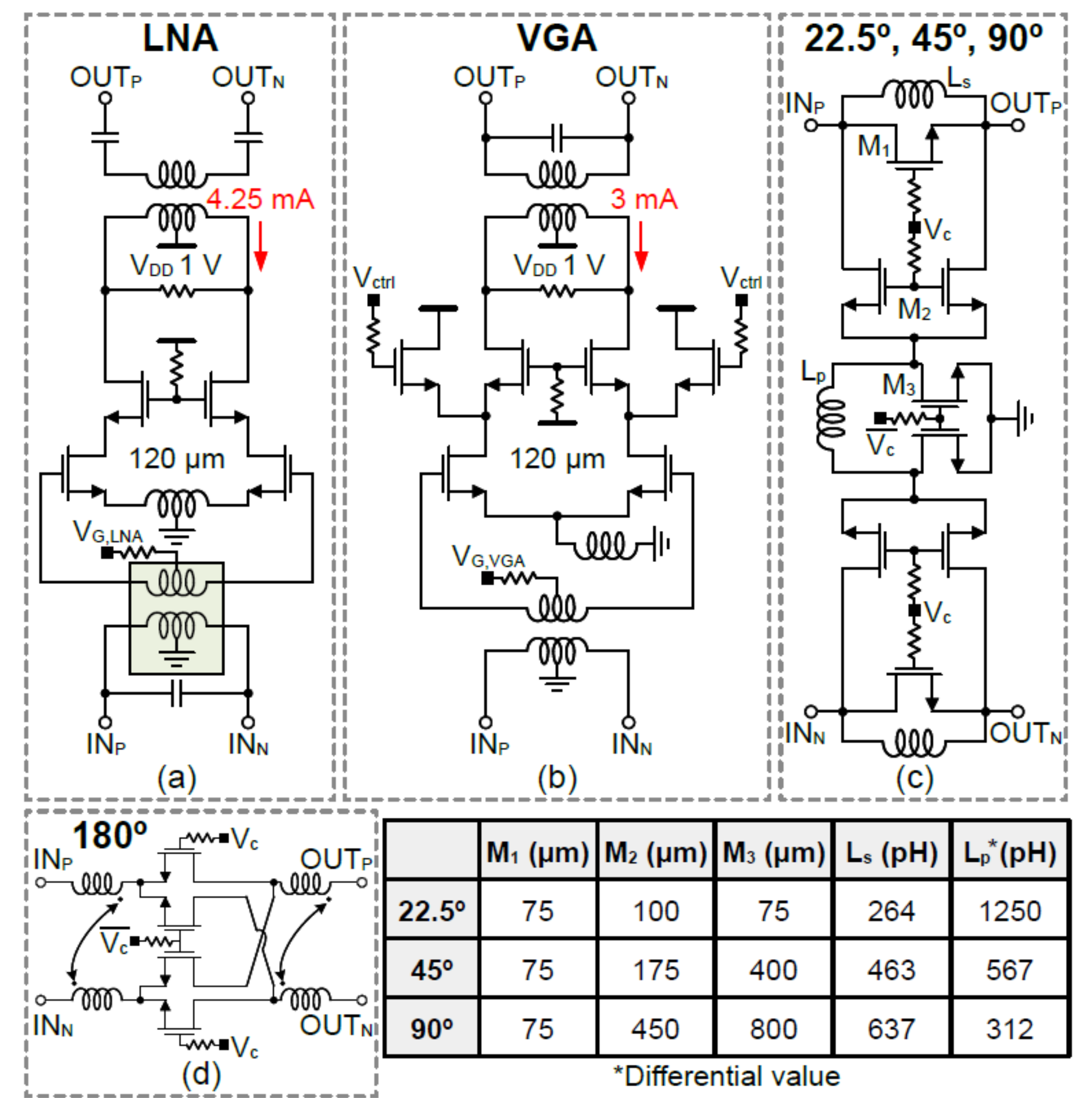


Fig. 3. Schematic of the (a) LNA, (b) VGA, (c) phase shifters, and (d) double-pole double-throw switch

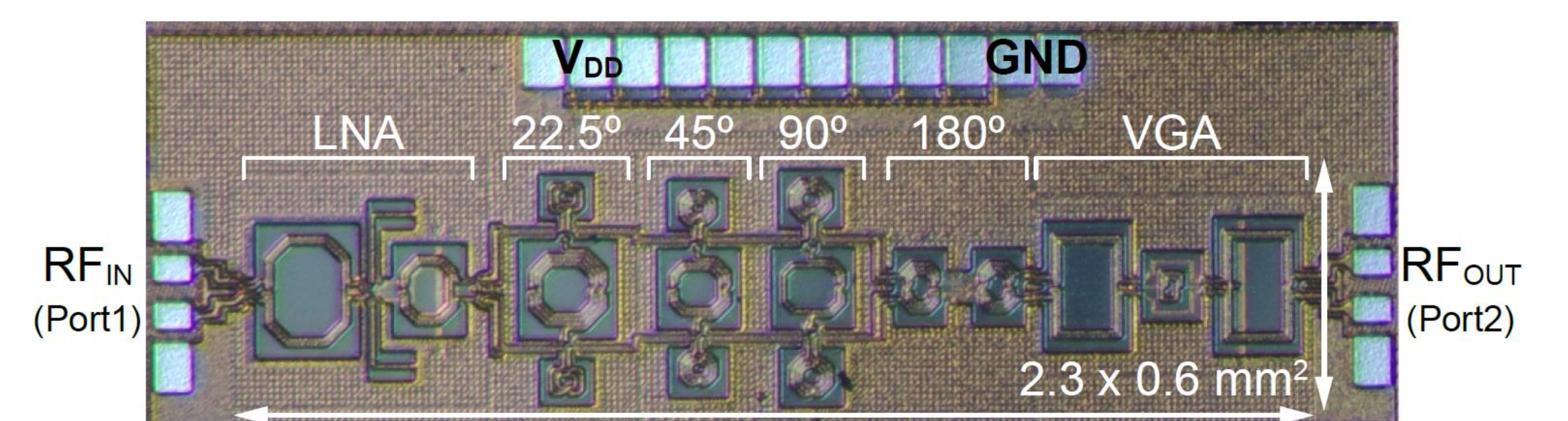


Fig. 4. Chip photograph

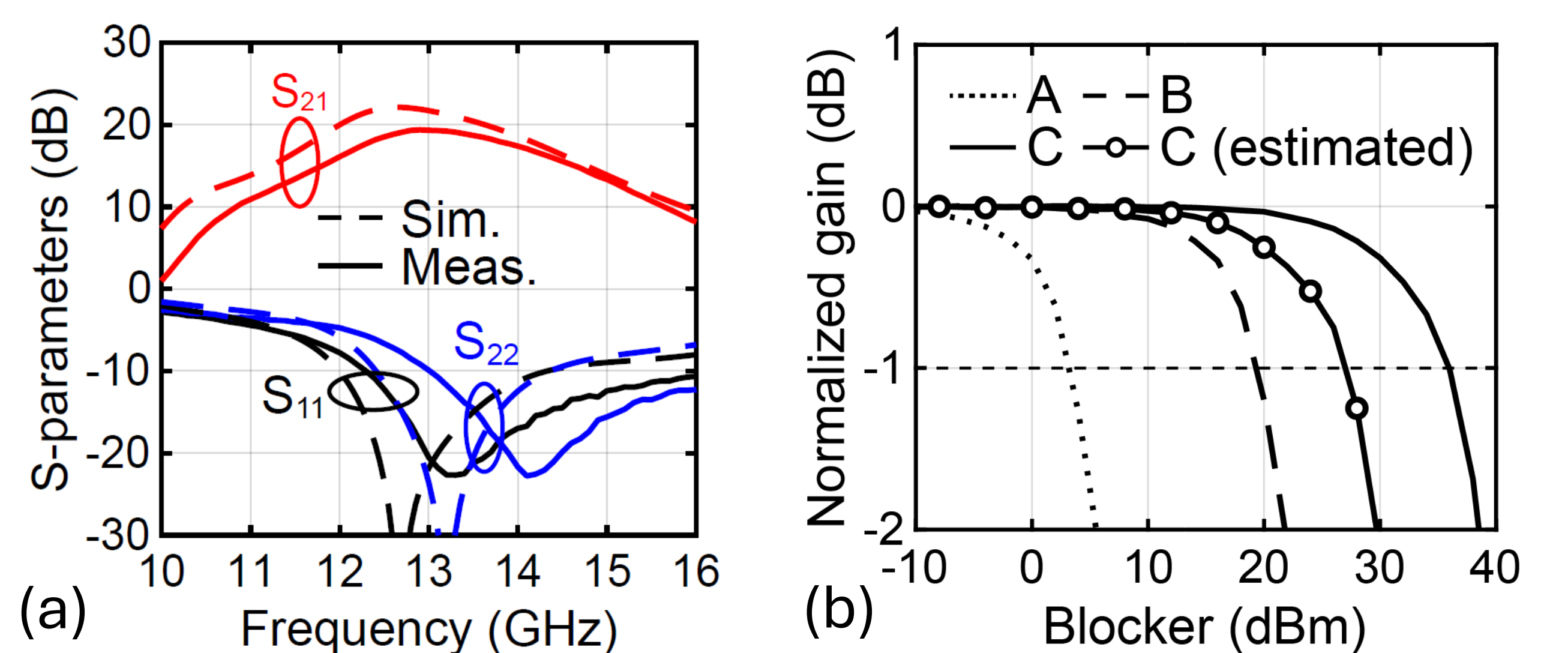


Fig. 5. Measurement results. (a) S-parameters. (b) Estimated B_{1dB}.